Globalization and human cooperation

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Globalization magnifies the problems that affect all people and that require large-scale human cooperation, for example, the overharvesting of natural resources and human-induced global warming. However, what does globalization imply for the cooperation needed to address such global social dilemmas? Two competing hypotheses are offered. One hypothesis is that globalization prompts reactionary movements that reinforce parochial distinctions among people. Large-scale cooperation then focuses on favoring one's own ethnic, racial, or language group. The alternative hypothesis suggests that globalization strengthens cosmopolitan attitudes by weakening the relevance of ethnicity, locality, or nationhood as sources of identification. In essence, globalization, the increasing interconnectedness of people worldwide, broadens the group boundaries within which individuals perceive they belong. We test these hypotheses by measuring globalization at both the country and individual levels and analyzing the relationship between globalization and individual cooperation with distal others in multilevel sequential cooperation experiments in which players can contribute to individual, local, and/or global accounts. Our samples were drawn from the general populations of the United States, Italy, Russia, Argentina, South Africa, and Iran. We find that as country and individual levels of globalization increase, so too does individual cooperation at the global level vis-à-vis the local level. In essence, "globalized" individuals draw broader group boundaries than others, eschewing parochial motivations in favor of cosmopolitan ones. Globalization may thus be fundamental in shaping contemporary large-scale cooperation and may be a positive force toward the provision of global public goods.

economic experiments | social dilemmas | public goods provision | cosmopolitanism | parochialism

With increased globalization the problems affecting all individuals become increasingly apparent. The overharvesting of natural resources and human-induced climate change are but two global social dilemmas requiring large-scale human cooperation (1–6). What are the prospects for cooperation across large-scale societies in a globalizing world? Globalization is conceptualized as the increased connectivity (7) and interdependence (8) among people worldwide and the intensified consciousness of the "world as a whole" (9). Globalization connects individuals on a scale more expansive in scope and temporally compressed than ever before (10, 11). However, what does globalization imply for large-scale human cooperation?

At present, we do not know. Cooperation among unrelated people is common, even in situations where individuals cannot build a cooperative reputation or reciprocate others' cooperation. Theories of kin selection (12) and reciprocal altruism (13, 14) offer inadequate explanations (15). Theories of indirect reciprocity (16, 17) and especially of cultural and gene–culture coevolution (18–21) forward sound accounts for the emergence of large-scale cooperation. Yet, we have little understanding of the patterns of large-scale cooperation in contemporary societies (15). Both theoretically and empirically the emphasis is with parochialism (22–24). These theories suggest that the diffusion

of symbolically marked ideologies and large-scale communication technologies prompt individuals to extend basic "tribal social instincts," developed in interactions within hunter–gatherer societies, to very large groups of individuals (25, 26).* However, what happens when parochialism interacts with globalization?

Two competing hypotheses have been offered. The first is that globalization reinforces parochialism by strengthening the demarcation between one's ethnic, local, or national group and the outgroup (30–32). The surge in xenophobic political parties, in movements defending local community interests, and the revival in "ethno-nations," such as Basque, Scots, Quebecois, are interpreted as antiglobalization reactions (30, 33). If correct, the prospects for large-scale human cooperation are bleak.

The second hypothesis holds that globalization strengthens cosmopolitan attitudes by weakening the relevance of ethnicity, locality, or nationhood as sources of identification (32, 34, 35). Individuals overcome the "ingroup"–"outgroup" tension of parochialism and experience a sense of common belonging merely by virtue of inhabiting the same planet; "humankind becomes a 'we' where there are no 'others'" (11). The growth since the 1960s of global campaigns for human rights and humanitarian relief, and of foreign aid to developing countries, is seen as a manifestation of this cosmopolitan conscience (33). If correct, the prospects for large-scale cooperation are promising.

We test these hypotheses experimentally by measuring individual propensities to cooperate with local and global others in a multilevel sequential contribution (MSC) experiment. Our samples are drawn from the general population of national citizens in six countries: Argentina, Iran, Italy, Russia, South Africa, Russia, and the United States. We use responses to an individual level globalization index (developed for this research) in combination with an aggregate country-level measure as predictors to determine whether globalization is associated with parochial or cosmopolitan inclinations as manifest in cooperation at local and global levels.

Research Framework. Our research was conducted in six industrialized countries that differ broadly in aggregate levels of globalization, as measured by the country-level globalization index (CGI henceforth) produced by the Centre for the Study of Globalization and Regionalisation at the University of Warwick, U.K (48). [See Section 1 of supporting information (SI) *Appendix*

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for further details and descriptive statistics of the index.] Within each country the research was conducted in a large metropolitan area: Columbus (Ohio, U.S.), Milan (Italy), Kazan (Tatarstan, Russia), Buenos Aires (Argentina), Johannesburg (South Africa), Tehran (Iran), and in surrounding areas. The use of the same quota-sampling recruitment method and the implementation of other standard controls (36) in each country ensure the cross-country comparability of the datasets. Quotas were applied to the demographic characteristics of gender, age, and socioeconomic status. Approximately 190 subjects per country were recruited for a total of 1,145 participants in the study. Descriptive statistics of the country samples can be found in *SI Appendix* Table S2.

Cooperation was measured by using an MSC experiment. The protocol resembles that of a multilevel public-goods experiment (37, 38) except that subjects do not make decisions directly affecting those in their concurrent groups. Subjects decide whether to make a contribution, and their choice affects their own payoff. Their choice also affects the payoffs of others in future sessions. Subjects made a series of contribution decisions in a fixed order. Details of the experiment protocol can be found in Sections 3 and 5 of the *SI Appendix*. The last decision is the focus of this article; it measures whether individuals are self-interested, willing to cooperate exclusively with people from their own locality, or, alternatively, to cooperate with groups from around the world.

For each decision, subjects were given 10 tokens. One token was worth the purchasing power equivalent of U.S. $0.50. The task for the subjects was to decide how to allocate tokens between their Personal account, their Local account, and their World account. Each token put into the Personal account was saved and was worth a single token to the subject. Each token put into the Local account (LOCAL henceforth) was added to the Local contributions by 3 other (anonymous) subjects from the same area. This total was doubled by the experimenter, and the subject received a 1/4 share of that amount. Each token allocated to LOCAL entailed a half-token loss for the subject and yielded a half-token to each of the 3 others matched with that subject at the local level.

Tokens placed in the World account (WORLD henceforth) were summed, tripled by the experimenter, and the subject received a 1/12 share. This world group was made up of the subject, the same 3 local people who were part of LOCAL, plus two 4-person groups from different countries. Subjects were not told which countries these other subjects were from, but they were informed that these countries might have been from any of the four continents where the research was conducted. Each token allocated to WORLD entailed a 3/4 token loss for the subject and yielded a 1/4 token to each of the 11 others matched with that subject.

This structure of incentives resembles a multilevel public-goods dilemma. A schematic representation of the decision is depicted in Fig. 1. In the MSC, a selfish individual would allocate all tokens to the Personal account because both the Local and World accounts bear a smaller return. If no one contributed, the subject would end up with the initial 10 tokens. In public-goods experiments, there is considerable evidence that people contribute to the local or global accounts (4, 5, 15, 23, 28, 29, 36–38). In the MSC, a subject is concerned both with what others have contributed as well as with the impact of her contributions on future groups. If the subject makes contributions to either the Local or World accounts there is a tension over how to allocate tokens. The return per token contributed is higher in the Local account (0.5) than in the World account (0.25). But, if all individuals allotted their tokens to their World account, this would result in a larger payoff (30 tokens) to each subject than if all allocated their endowment to their Local accounts (20 tokens). We regard contributions to LOCAL as reflecting

Fig. 1. The nested nature of the World decision. Individual I may allot the money to his or her Personal account and/or allot it to his or her Local or World group account. The 3 numbers in brackets [*x*, *y*, *z*] represent the returns to I (*x*), to another person from I's local group (*y*), and to a person from a different country (*z*) from a token allotted to I's Personal, Local, or World account, respectively. That is, a token allotted to the Personal account (dotted line) gives 1 token to I and nothing to anyone else. A token allotted to the Local account (dashed line) yields half a token to all of the 3 members of I's Local account but nothing to the people from the other two Local groups. A token allotted to I's World account (solid line) yields a quarter of a token to all of the 12 people in the World group.

parochial interests and contributions to WORLD as reflecting cosmopolitan interests. The design of this game maps onto the nature of local–global relations in that globalization does not exclude cooperation or interaction with the local constituency but expands inclusion to both local and nonlocal actors. Our design specifically aims to reproduce in a laboratory setting the structure of incentives typical of public-goods provision at different levels of interaction.[†]

In our analysis, we predict contributions to WORLD. Explanatory variables are the CGI score for each country and each individual's score on the Individual-level Globalization Index (IGI). The IGI is analogous to the CGI and measures the degree to which an individual participates in the network of global economic, social, and cultural relations. A typical question asks the frequency with which the individual utilizes a certain medium of global connection. For example, a cultural interaction question is, "How often do you watch a television program or movie from a different country?" A typical question may also regard the scope with which the individual utilizes the global connection. For example, a social interaction question asks, "If you use a mobile phone, do you use it to contact people living in other parts of your country or people living in other countries?" Finally, questions may simply query whether the individual is involved in an interaction that is global in character. For example, a question regarding economic interactions is, "Do you work for a multinational or foreign-owned company?" The resulting index assigns higher scores to individuals who are frequently connected in worldwide interactions and lower scores to individuals who are rarely connected and do so on a more limited territorial scope. At the lowest end of the scale are those individuals lacking connectivity all together (see *SI Appendix* Sections 1, 2, and 4 for more details).

[†]To be sure, the use of other symbolic attributes to identify both the local and the world groups than just their territorial denomination might have triggered an even stronger psychological salience to individuals. However, the use of culturally distinctive traits with higher symbolic value, particularly at the local level, would have substantially hampered the cross-country comparability of the results. It remains a subject for further investigation to ascertain how much people's choices are affected by varying the symbolic "loading" of group attributes.
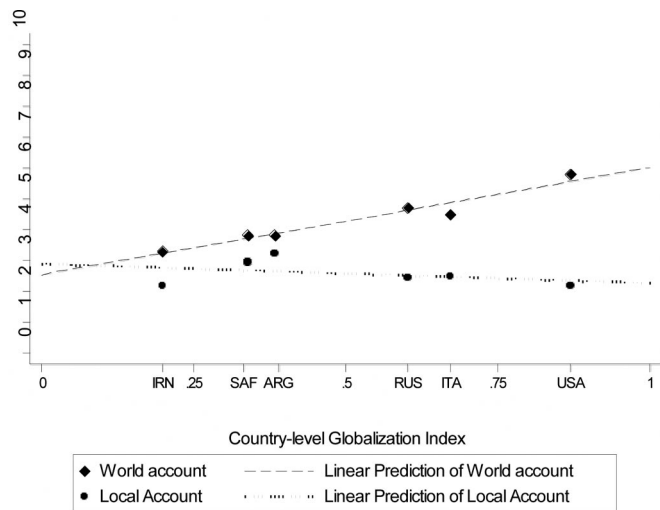
Fig. 2. Relationship between CGI and mean Allocations to World and Local Accounts. Countries are plotted according to their macrolevel globalization score on the x axis and mean aggregate levels of contribution to the World account (diamond points), and Local accounts (square points) on the y axis. The linear predictions for both variables are also plotted.

Results

The WORLD decision tests whether globalization is associated with parochial or cosmopolitan patterns of cooperative behavior. Parochial motivations discriminate in favor of people belonging to one's ethnic, racial, or language groups. Conversely, cosmopolitan motivations extend to groups of individuals characterized only as global others. Therefore, the parochial (cosmopolitan) hypothesis implies that more globalization is associated with less (more) cooperation at the world level in relation to cooperation at the local level.

At the aggregate level, propensities to cooperate with others in WORLD significantly differ across the six countries. A Kruskall–Wallis test strongly rejects the null hypothesis that country samples are from an identical population ($Z = 71.79$; $P = 0.00$; $n = 1114$; see *SI Appendix* Table S5 for pairwise tests). There is a positive relationship between a country's CGI and its mean cooperation rate. This is shown in Fig. 2, which plots the mean contributions to WORLD for the six countries (dashed line), ranked on the horizontal axis according to their CGI score. In fact, the rank of countries for mean cooperation rates is highly correlated with the rank according to the CGI (Spearman's $\rho = 0.94$; $P = 0.00$; $n = 6$). Conversely, the relationship between the CGI and cooperation into LOCAL tends to follow a decreasing trend, as shown in Fig. 2 (dotted line), but the correlation is not significant (Spearman's $\rho = -0.31$; $P = 0.54$; $n = 6$). Even in this case, a Kruskall–Wallis test strongly rejects the null hypothesis that country samples are from an identical population, but the Z statistic is now lower than that for WORLD ($Z = 31.36$; $P = 0.00$; $n = 1114$; see *SI Appendix* Table S5 for pairwise tests). Hence, macrolevel globalization seems to correlate strongly with increased cooperation at the world level, but is uncorrelated with cooperation at the local level.

The significant differences in allocations across countries are consistent with recent evidence coming from 15 industrialized societies (39) and with theories of gene–culture coevolution allowing for different "cultural" equilibria to emerge from the evolutionary process (18). What is most of note is that such country differences in cooperative behavior do not appear to be unsystematic, but are correlated with country-level globalization. One might argue that this derives from globalization in turn being correlated with other macrolevel variables, such as eco-

nomic development or the quality of institutions. Yet, analysis of the CGI along with a host of macroindicators such as the rule of law, generalized trust, per capita income, and norms of civic cooperation shows that the CGI is the only macrovariable that is significantly correlated with mean cooperation rates at the world level (Spearman's $\rho = 0.94$; $P = 0.00$; $n = 6$; see *SI Appendix* Table S6). Conversely, at the local level no indicator is correlated with mean cooperation (see *SI Appendix* Table S6).

Cross-cultural studies recently conducted in 15 small-scale societies have failed to find systematic individual-level effects on experimental behavior even when they found society-level and location effects (40–42). We examine whether this is the case in our study. We take individual contributions to WORLD as the dependent variable. Given the ordinal and discrete nature of this variable, we estimate an ordered logistic econometric model. Individual demographic variables (income, education level, gender, age) are included as controls. An individual's contribution to the local account in the first decision (LOCAL 1) is also included in the regression as a control for an individual's baseline propensity to cooperate with others at the local level.[‡] The IGI enters into the regression to measure the individual level of globalization. We also include dummy variables identifying the locations where the research has been conducted (country and region within each country). In this way we are able to control for both the macro effects of globalization observed in the previous section and for heterogeneity across locations. Robust standard errors clustered per experimental session have been used.

We find significant effects on contributions to WORLD for the IGI ($Z = 1.32$, $P = 0.03$, 2-sided, $n = 1,027$) and strongly significant effects for LOCAL 1 ($Z = 0.38$, $P < 0.00$, 2-sided, $n = 1,027$). The marginal effects for both variables on WORLD are always positive for all outcomes in which no less than 5 tokens are allocated to WORLD and negative for all other outcomes (see *SI Appendix* Table S8B). The significance of LOCAL 1 is not surprising. It reveals subjects' consistency in their cooperative behavior between the two decisions. What is most of interest for our analysis is the significant effect of IGI. It shows that individual globalization is significantly correlated to propensity to cooperate with global others even after controlling for an individual's basic propensity to cooperate with local others. None of the other controls is significant at conventional levels (see *SI Appendix* Table S8A).

Fig. 3 draws on this econometric analysis to represent the joint impact of macro- and microglobalization on the propensity to cooperate at the world level. It plots the predicted probabilities of allocating 5 or more tokens to WORLD as a function of the IGI for each country. The diagram shows in each country a positive influence of IGI. It also highlights a strongly positive correspondence between the country ranking in terms of globalization and the probability to contribute to WORLD no less than 5 tokens. Overall, the analysis suggests that macro- and microglobalization (as indicated by the CGI and IGI, respectively) are associated with substantial variations in cooperation with global others. For instance, the predicted probability is equal to 0.77 for the most globalized individual living in the U.S., which is more than four times as much as the corresponding probability for the least globalized individual living in Iran (0.17). Hence, not only is living in a more globalized country associated with more cooperation at the world level, but the same relationship holds as the degree of individual global connectedness increases as well. The cosmopolitan hypothesis receives clear support from our experiments.

[‡]This first decision is similar to this decision except that subjects only chose to allocate between a Personal and a Local account. The first decision looks much more like a traditional public-good choice. See *SI Appendix* Sections 3 and 5 for more details.

Fig. 3. Predicted probabilities of allocating 5 or more tokens into WORLD. The graph shows the relationship between the individual-level globalization index and the predicted probability of contributing 5 or more tokens to WORLD in the six countries of our study. All of the other variables in our regression are kept at their mean country values. An increase in the IGI is associated with a substantial increase in such probability in each country. Likewise, a higher country ranking in terms of CGI is generally associated with a higher probability.

Discussion

Our research suggests that globalization is a powerful force for shaping large-scale cooperation in today's societies. Among subjects drawn from the general populations of six countries widely varying in levels of globalization, our results demonstrate that higher levels of globalization, at both the aggregate country and individual levels, are associated with greater propensities to favor cooperation with globally distal others compared with compatriots living in the same locality. The nature of our data does not enable us to investigate fully the direction of causation. If cooperation influences globalization, one would have to assume that greater individual propensities for cooperation prompt greater individual-level engagement in large-scale connections. However, we are unaware of theories explaining how this may be the case. Instead, we believe that the effect of globalization can be accounted for by the idea that individuals living in more globalized countries are more likely to engage in social connections with people living in localities distant from their own, which in turn likely stimulates sentiments of empathy with them. In other words, globalization may reduce an individual's perceived social distance with geographically distant others, thus being conducive to an increased propensity to cooperate with them (43–45).

The evidence we gathered is reminiscent of evidence coming from 15 small-scale societies showing a high degree of correlation between average prosocial behavior and an index of the society's market connectedness (40). This result has been interpreted in terms of market interactions making people more accustomed to the idea that strangers can be trusted (40) or more morally responsible through the increased awareness of others' economic conditions (46). Because globalization spans a broader range of connections than purely economic ones (i.e., social and cultural connections as well), our study points to the relevance of connections under these other domains in molding cooperative behaviors. Greater knowledge of the global social dilemmas that we are all facing is likely to have an impact on likelihood of cooperation to solve them (4, 5).

It is worth stressing that the evidence we found in support of the cosmopolitan hypothesis is not in contrast with gene–culture coevolutionary theories. These theories emphasize that social norms are highly context-dependent and are basically influenced by the imitation of successful individuals or by the majority of the group (18). In globalized societies, it is increasingly likely that such processes of learning and norms acquisition are carried out in relation to people from different ethnic/racial/national backgrounds than one's own, thus, observing higher degrees of cooperation at the world level is consistent with these theories.

The variation in behavior that globalization seems to account for in our experiments makes it clear that it is a key element in understanding large-scale cooperation in contemporary societies. To be sure, parochial attitudes remain a relevant determinant of patterns of cooperation in many domains of interactions. Moreover, by construction our experimental design does not address a relevant problem specific to the provision of global public goods, namely, the necessity of achieving cooperation within extremely large groups. This should be a matter for further investigation, especially because our understanding of the impact of increasing group size on cooperation is still at a preliminary stage (4, 5, 47). However, our findings suggest that humans' basic ''tribal social instincts'' (22, 24, 25) may be highly malleable to the influence of the processes of connectedness embedded in globalization. The degree to which this is the case and the exact ways in which globalization influences patterns of cooperation at the individual psychological and aggregate societal levels are obviously a matter of further investigation. Overall, the results of our research suggest that large-scale cooperation among citizens from very different countries can emerge, and thus it is possible to address threatening global issues.

Methods

Participants were paid the purchasing power equivalent of U.S. $8.00 as a show-up fee. Average take-home earnings from the experiment were the purchasing power equivalent of U.S. $34.00. A session lasted ≈1 h. The *Economist*'s Big Mac index (http://www.economist.com/markets/bigmac/index.cfm) was used to compute the appropriate equivalents across countries, and the local research collaborators were consulted as well.

To control for any extraneous cultural effects that could bias results, standard controls used in international experiments were used (36). All materials and procedures for conducting the experiment were standardized across countries, the experimenter script and participant instructions were translated and back-translated from English into the native language, and token values were equalized by using purchasing power parity. Because of the great variance in education levels, payoff matrices were conveyed through pictorial illustrations, and several comprehension checks were administered through the course of the experiment to assure understanding of the task. Furthermore, the core research team jointly conducted pilot tests of the experiment, allowing each team member to observe and to conduct the experiment. Local country collaborators were then trained by members of the research team and they (as opposed to the foreign researchers) maintained contact with subjects throughout the experiment to avoid any face-saving or impression management behaviors. The local collaborators were consulted on issues requiring local adaptation, for example, in determining the appropriate means of assessing a participant's social and economic status.

Because of the logistics of the research, it was impossible to run the experiments simultaneously within a single country and during the same hours in different countries. We thus had to rely on a dynamic matching procedure, where past decisions from other participants were used to determine the payoffs of subjects currently taking part in the research. When possible, matching at the local level happened among people taking part in the same session. An algorithm was produced that ensured that a subject's choices entered the dataset as the experiments ensued. These decisions were used to match people's decisions in subsequent sessions. Starting data for these decisions was provided by pilot tests that occurred in each country before the experiment and through a series of pilot tests conducted in four countries during the preceding 2 years. The decisions of people who partici-

pated in the last session of the research will be used in future research projects of our group as starting data.

Given the dynamic nature of the matching procedure, the groups of people benefiting from one's contributions to the collective account (the ''beneficiaries'') and the group of people whose contributions an individual benefited from (the ''benefactors'') were not necessarily the same. This is not usual in social dilemmas experiments, but it was made necessary by the logistical problems intrinsic to our research. The instructions tried to convey in as simple a way as possible the nature of the cooperation problem. They explicitly pointed out that (*i*) other people's decisions (coupled with their own decisions) would determine one's payment, and (*ii*) the subject's own choices would determine the payments to others, depending on the group into which the subject would be mixed.

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